If we assume the expression $a + b \sin$ Z. D. for the discordance, and determine by least squares the values of a and b for each month, we obtain the following values:—

	a	b
	"	"
January	−0.01	+0.97
February	−0.01	+0.93
March	−0.01	+1.13
April	−0.04	+1.29
May	−0.11	+1.49
June	−0.09	+1.47
July	−0.07	+1.37
August	−0.06	+1.22
September	−0.04	+1.14
October	−0.06	+1.12
November	0.00	+1.09
December	−0.04	+0.99

Showing a well-marked inequality in b of 0".6. The cause of this inequality is at present the subject of further investigation.

The Apparent Places of Close Polar Stars.

By A. M. W. Downing, M.A.

In the *Monthly Notices*, vol. l., pp. 357–359, Mr. Turner calls attention to certain discordances in the apparent places of polars, as given in the different Ephemerides for 1891 and some preceding years. As modifications have been introduced both into the *Connaissance des Temps* and into the *Nautical Almanac* since the publication of Mr. Turner's note, I have thought that it would be worth while communicating to the Society the results of comparisons of the apparent right ascensions of *Polaris*, λ *Ursæ Minoris*, and σ *Octantis*, as given in the *Connaissance des Temps* and *Nautical Almanac* for 1894, as well as of the apparent right ascensions of the two first-named stars as given in the *Berliner Jahrbuch* and in the *American Ephemeris*, with those of the *Nautical Almanac* for the same year. As the *Berliner Jahrbuch* for 1894 had not reached me when this work was undertaken, the method of procedure followed was to compare the places in the *Berliner Jahrbuch* for 1893 with those of the *Connaissance des Temps* for the same year, and from the results of the comparison of the places in the latter publication with those of the *Nautical Almanac* for 1894 to deduce the differences of places of the *Berliner Jahrbuch* and of the *Nautical Almanac*. It may be remarked that no change was

made, either in the *Connaissance des Temps* or the *Berliner Jahrbuch*, in the adopted methods of computing apparent places of polars in 1894, so that the results obtained from a comparison of the places for 1893 may be assumed to hold good for 1894 also. In all these comparisons the effect of difference of longitude of the meridians for which the computations of the different Ephemerides were made has been taken into account.

In 1894 an important modification was introduced into the *Nautical Almanac*—viz., terms of the second order in the "star-corrections" have been taken into account in the cases of the close polar stars by the method proposed by Fabritius (*Ast. Nachrichten*, Nos. 2072 and 2073), the form adopted being the very convenient one given by Oppolzer in his *Traité de la détermination des Orbites*, p. 264 :—

$$\alpha - \alpha_0 = \Delta\alpha_0 + \tan \delta_0 \, \Delta\alpha_0 \, \Delta\delta_0 \sin 1'',$$
$$\delta - \delta_0 = \Delta\delta_0 - \tfrac{1}{2} \cot \delta_0 \, \Delta\alpha_0^2 \sin 1'',$$

where α_0, δ_0 are the mean values of the coordinates for the beginning of the year. This method is also adopted in the *Connaissance des Temps*, and the same terms of nutation being used in it and in the *Nautical Almanac*, the agreement between the "star-corrections" for polars ought now to be very close, as in fact it will be seen to be by reference to the tables of comparisons given below. The difference in the adopted value of the precession constant gives rise principally, of course, to a discordance proportional to the time (as does also a difference in the adopted proper motion), and is well marked in the case of the places of *Polaris*.

In both the *Berliner Jahrbuch* and the *American Ephemeris* the corrections due to the effect of the terms of a higher order than the first are computed from the ordinary formulæ, somewhat similar expressions being used in both publications. In the *Berliner Jahrbuch* the same terms of nutation are employed as in the *Connaissance des Temps* and *Nautical Almanac*; whilst in the *American Ephemeris* several additional terms are taken into account.

Most of these have very small coefficients, and in the present state of astronomy may perhaps be safely neglected. One pair of terms, however, with argument $(2\odot - \Omega)$, seem to make their effect very sensible in the comparison between the *Nautical Almanac* and the *American Ephemeris*, giving rise to an inequality with period of about six months, which is apparent both in the case of *Polaris* and in that of λ *Ursæ Minoris*. The terms in question are—

In obliquity $\quad -''\cdot 0067 \cos (2\odot - \Omega)$;
In longitude $\quad +\cdot 0125 \sin (2\odot - \Omega)$;

and these might perhaps be introduced into the expressions for

the "Day Numbers" in the other Ephemerides also with advantage.

The tables given below require very little explanation. A "group" is the mean of ten days (except, of course, Group xxxvii.), and the differences are the actual differences corrected only for longitude, where this correction is sensible. These mean differences have been plotted down, and curves drawn, where it appeared necessary, to guide the eye in estimating the periodic discordances. The agreement between the *Connaissance des Temps* and the *Nautical Almanac* is practically complete, the greatest discordance—viz. $0^s{\cdot}05$ for λ *Ursæ Minoris*—being in arc of a great circle $\frac{{\cdot}05 \times 15}{56}$, or $0''{\cdot}01$. The periodic discordances between the *Berliner Jahrbuch* and the *Nautical Almanac* (which seem to be clearly enough indicated, although the quantities are so small) may be due to difference in the method of correcting for second order terms, for, as stated above, the same terms of nutation (as well as the same constant of precession) are employed in the computations in each case. The discordances existing between the *American Ephemeris* and the *Nautical Almanac* may be partly due to the same cause, but in their more marked features they are probably to be ascribed to the effect of the additional terms of nutation adopted in the *American Ephemeris*, which have been referred to above.

The amount of Fabritius' correction for *Polaris* and λ *Ursæ Minoris* is also exhibited graphically for every tenth day throughout the year 1894, in order to enable the reader to form an estimate of its magnitude and variation during the course of a year. It will be remarked that, although the horizontal scale is the same, the vertical scale in this case is only one-tenth of what it is in the comparisons of the stars' right ascensions.

Generally, the close agreement of the "star-corrections" for these polars, as given in the different Ephemerides, will be remarked, as well as the great improvement that has taken place in this respect during the last few years.

Right Ascensions of Polaris.

Group.	N. A.—C. T. 1894. s	N. A.—A. E. 1894. s	C. T.—B. J. 1893. s
I.	+0·049	−1·398	−1·167
II.	+0·059	−1·396	−1·178
III.	+0·064	−1·390	−1·183
IV.	+0·067	−1·407	−1·182
V.	+0·070	−1·432	−1·180
VI.	+0·071	−1·438	−1·170
VII.	+0·079	−1·455	−1·168
VIII.	+0·080	−1·443	−1·156
IX.	+0·082	−1·433	−1·145

Group.	N. A.−C. T. 1894. s	N. A.−A. E. 1894. s	C. T.−B. J. 1893. s
X.	+0·081	−1·446	−1·154
XI.	+0·085	−1·425	−1·163
XII.	+0·090	−1·407	−1·149
XIII.	+0·092	−1·406	−1·145
XIV.	+0·089	−1·406	−1·140
XV.	+0·092	−1·400	−1·154
XVI.	+0·093	−1·370	−1·154
XVII.	+0·095	−1·381	−1·138
XVIII.	+0·095	−1·398	−1·151
XIX.	+0·097	−1·397	−1·166
XX.	+0·093	−1·390	−1·144
XXI.	+0·095	−1·389	−1·147
XXII.	+0·095	−1·381	−1·166
XXIII.	+0·098	−1·416	−1·157
XXIV.	+0·100	−1·420	−1·162
XXV.	+0·100	−1·415	−1·163
XXVI.	+0·100	−1·424	−1·171
XXVII.	+0·101	−1·427	−1·183
XXVIII.	+0·100	−1·400	−1·173
XXIX.	+0·104	−1·402	−1·184
XXX.	+0·101	−1·407	−1·205
XXXI.	+0·104	−1·414	−1·190
XXXII.	+0·106	−1·394	−1·195
XXXIII.	+0·110	−1·384	−1·209
XXXIV.	+0·103	−1·391	−1·206
XXXV.	+0·108	−1·405	−1·208
XXXVI.	+0·108	−1·403	−1·216
XXXVII.	+0·110	−1·405	−1·225
	Right Ascensions of λ Ursæ Minoris.		
I.	−0·564	−1·032	+0·309
II.	−0·567	−1·042	+0·328
III.	−0·566	−1·015	+0·331
IV.	−0·563	−1·020	+0·319
V.	−0·562	−1·011	+0·319
VI.	−0·569	−1·027	+0·303
VII.	−0·574	−1·030	+0·303
VIII.	−0·575	−1·034	+0·295
IX.	−0·576	−1·041	+0·278

Group.	N. A.−C. T. 1894. s	N.A.−A. E. 1894. s	C. T.−B. J. 1893. s
X.	−0·577	−1·056	+0·281
XI.	−0·581	−1·041	+0·287
XII.	−0·584	−1·055	+0 275
XIII.	−0·589	−1·043	+0·274
XIV.	−0·592	−1·011	+0·292
XV.	−0·588	−1·012	+0·308
XVI.	−0·59	−1·012	+0·298
XVII.	−0·595	−1·010	+0·292
XVIII.	−0·597	−1·015	+0·311
XIX.	−0·602	−1·003	+0·327
XX.	−0·604	−1·032	+0·303
XXI.	−0·608	−1·038	+0·317
XXII.	−0·610	−1·032	+0·334
XXIII.	−0·599	−1·045	+0·329
XXIV.	−0·601	−1·040	+0·328
XXV.	−0·597	−1·020	+0·344
XXVI.	−0·597	−1·031	+0·350
XXVII.	−0·597	−1·018	+0·350
XXVIII.	−0·594	−1·000	+0·343
XXIX.	−0·594	−1·011	+0·345
XXX.	−0·586	−0·986	+0·353
XXXI.	−0·582	−0·986	+0·328
XXXII.	−0·584	−0·974	+0·315
XXXIII.	−0·576	−0 953	+0·341
XXXIV.	−0·577	−0·992	+0·317
XXXV.	−0·577	−0·979	+0·306
XXXVI.	−0·572	−0·975	+0·310
XXXVII.	−0·565	−1·007	+0·320

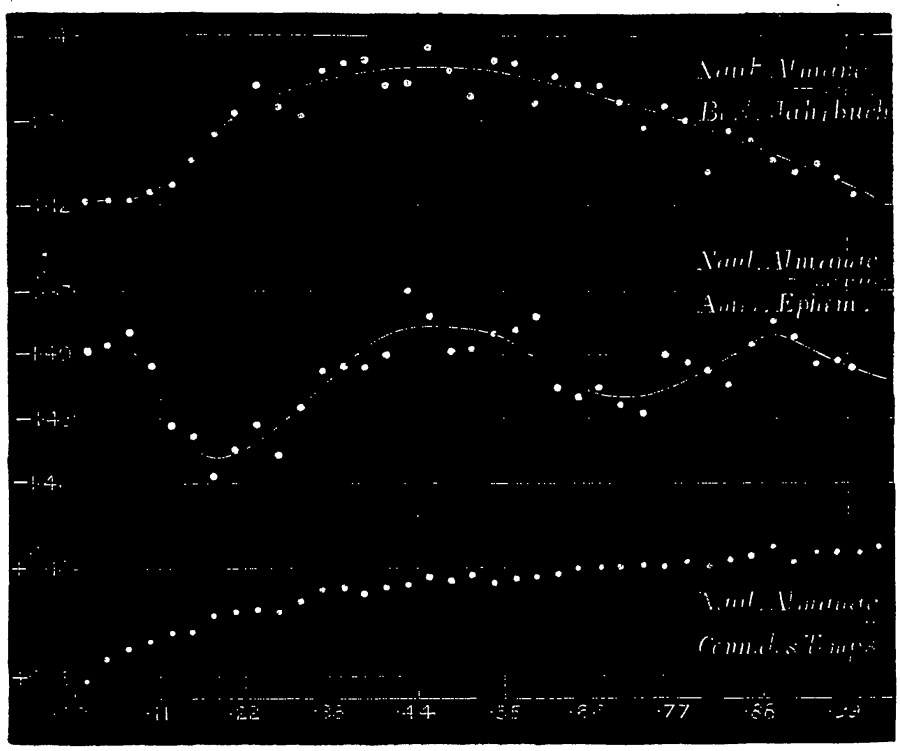
Right Ascensions of σ Octantis.

Group.	N. A.−C. T. 1894. s	Group.	N. A.−C. T. 1894. s
I.	+0·133	VIII.	+0·136
II.	+0·124	IX.	+0·133
III.	+0·121	X.	+0·130
IV.	+0·127	XI.	+0·128
V.	+0·134	XII.	+0·137
VI.	+0·134	XIII.	+0·134
VII.	+0·126	XIV.	+0·124

Group.	N. A.–C. T. 1894. s	Group.	N. A.–C. T. 1894. s
XV.	+0·126	XXVII.	+0·131
XVI.	+0·129	XXVIII.	+0·134
XVII.	+0·124	XXIX.	+0·135
XVIII.	+0·123	XXX.	+0·137
XIX.	+0 130	XXXI.	+0·140
XX.	+0·133	XXXII.	+0·142
XXI.	+0·122	XXXIII.	+0·145
XXII.	+0·127	XXXIV.	+0·143
XXIII.	+0·132	XXXV.	+0·152
XXIV.	+0·137	XXXVI.	+0·148
XXV.	+0·129	XXXVII.	+0·158
XXVI.	+0·130		

RIGHT ASCENSIONS OF POLARIS.

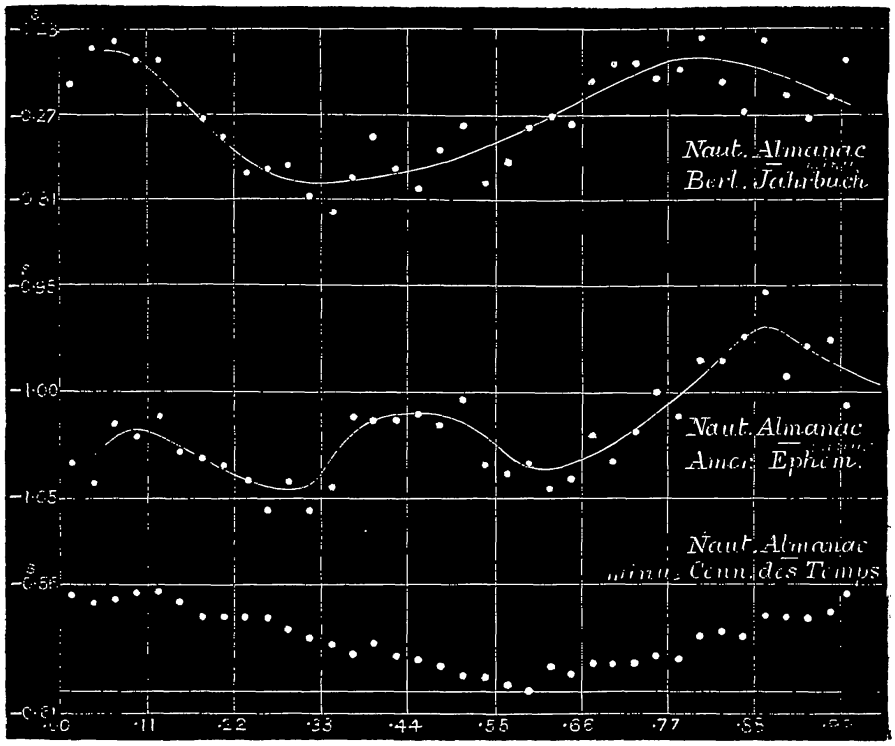
$\delta = 88° 45'$, sec $\delta = 45·8$.



The horizontal scale is fraction of the year.

RIGHT ASCENSIONS OF λ URSÆ MINORIS.

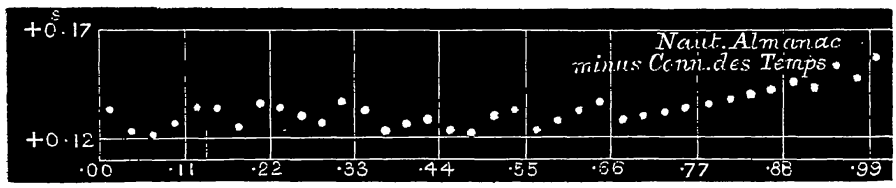
$\delta = 88° 59'$, sec $\delta = 56{\cdot}4$.



The horizontal scale is fraction of the year.

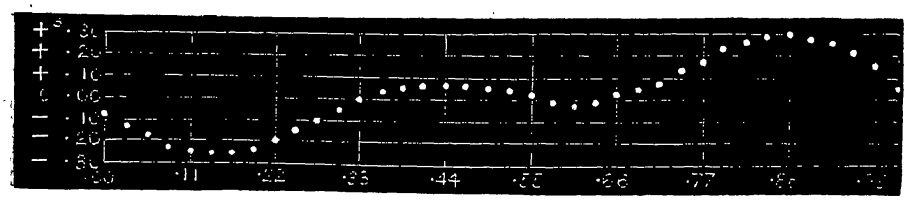
RIGHT ASCENSIONS OF σ OCTANTIS.

$\delta = 89° 16'$, sec $\delta = 78{\cdot}1$.



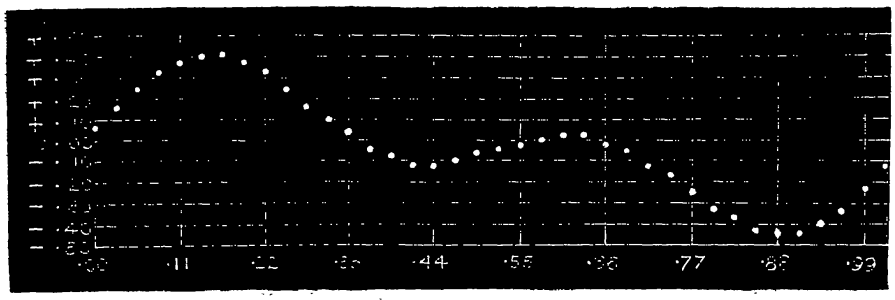
The horizontal scale is fraction of the year.

FABRITIUS' CORRECTION FOR POLARIS (R.A.) 1894.



The horizontal scale is fraction of the year.

FABRITIUS' CORRECTION FOR λ URSÆ MINORIS (R.A.) 1894.



The horizontal scale is fraction of the year.

Nautical Almanac Office:
1892 *March* 8.

Results of Double-Star Measures with the 8-inch Equatoreal at Windsor, N. S. Wales, in 1891. By J. Tebbutt.

Ref. No.	Star.	Observed Magnitude.	Approx. Place of Star. R. A. h m	Dec. S. ° ′	Fraction of Year.	Position Angle.	No. of Obs.	Distance. ″	No. of Obs.	Mag. Power.	Hour-Angles. h m	h m	Weight, 1 to 5.
1	*p* Eridani	6, 6	1 36	56 45	·739	...	...	7·30	10	170	2 30 E	2 15 E	5
2	,,	6, 6	,,	,,	·745	225·2	10	...	...	300	2 51 E	2 37 E	5
3	,,	...	,,	,,	·750	225·6	10	...	...	300	3 43 E	3 31 E	3
4	,,	6, 6	,,	,,	·758	225·6	10	...	...	...	2 37 E	2 21 E	5
5	,,	6, 6	,,	,,	·758	...	...	7·03	10	...	2 4 E	1 47 E	5
6	,,	...	,,	,,	·805	...	...	7·08	10	170	3 44 E	3 26 E	3
7	,,	...	,,	,,	·991	227·9	10	...	...	230	2 19 W	2 40 W	3
8	,,	...	,,	,,	·991	...	...	7·63	7	170	2 44 W	2 58 W	3
9	Lalande, 4219	8, 8	2 11	18 44	·745	335·6	10	...	..	300	2 32 E	2 20 E	4
10	,,	8, 8	,,	,,	·745	337·2	10	...	...	230	2 20 E	2 5 E	4
11	α Centauri	...	14 32	60 23	·515	205·8	10	...	...	300	2 56 E	2 43 E	4
12	,,	...	,,	,,	·559	207·6	10	...	...	230	0 52 W	1 9 W	2
13	,,	...	,,	,,	·561	205·9	10	...	...	230	2 29 E	2 20 E	4
14	,,	...	,,	,,	·561	...	...	19·10	10	170	1 51 E	1 34 E	3
15	,,	...	,,	,,	·583	...	...	19·40	10	170	1 0 E	0 40 E	2
16	,,	...	,,	,,	·583	205·4	10	...	...	300	0 36 E	0 0	3
17	,,	...	,,	,,	·613	205·0	10	...	...	230	0 47 E	0 38 E	3
18	,,	...	,,	,,	·613	...	...	18·91	10	170	0 38 E	0 14 E	3
19	,,	...	,,	,,	·616	...	...	19·09	10	170	0 25 E	0 12 E	3
20	,,	...	,,	,,	·635	207·5	10	...	...	300	4 8 W	4 22 W	3